RESEARCH ARTICLE

ESTHETIC NORMS FOR UDAIPUR POPULATION IN INDIA

*Dr. Nidhi Saraswat, Dr. Prabhuraj Kambalyal and Dr. Neel Patel

Department of Orthodontics and Dentofacial Orthopaedics, Pacific Dental College, Udaipur (Rajasthan), India

ARTICLE INFO	ABSTRACT
	Aim: The aim of the study was to establish Soft Tissue Cephalometric Norms for skeletal and dental relationships amongst local Udaipur population in Rajasthan state of India. **Materials and Methods:** Sixty subjects (30 Males & 30 Females) from different parts of Udaipur in the age group 18 to 25 Years (Mean age 21.3 Years) were selected at random for study and lateral cephalograms were taken. All the cephalograms were traced two times by Single operator at different time interval using conventional hand tracing. The parameters used in the study were taken from the parameters given by Arnett and Bergman soft tissue cephalometric analysis (STCA). Overall 46 measurements including 40 linear, 6 angular parameters were used. Mean and standard deviation values were also calculated. The difference between males and females were evaluated using student t-test. **Results:** The values obtained from the study showed significant difference in most of the parameters from that of Arnett *et al.* norms and between males and females within Udaipur population. **Conclusion:** Males had comparatively thicker soft tissue facial structures, acute nasolabial angle and thus more convex profile, increased midface deficiency, recessive lower face, and less upright mandibular incisors than females within Udaipur population. Also, there was deviation for parameters of overall population when compared to STCA norms.

INTRODUCTION

Aristotle said "Beauty is a greater recommendation than any letter of introduction". A statement that is true nowadays where attractive people have a much better chance of being successful. Dentists and orthodontists can greatly contribute to enhancing patient's smile, appearance, and subsequently self-confidence. Harmony between the dominant features of a face contributes to creating a beautiful face. The "Facial Dominant Features" are the smile with its components, teeth, gingiva and lips; eyes and facial frame. The term aesthetic refers to an understanding of beauty. Therefore it is required to have an understanding of beauty and the artistic tools available to develop a beautiful smile (Valo, 1995). However, Good occlusion does not necessarily mean good facial balance. To accurately predict soft tissue response to hard tissue changes, orthodontist must understand soft tissue behavior in relation to orthodontic and orthopedic changes and must also take into consideration growth and development of various soft tissue traits.

*Corresponding author: Nidhi Saraswat
Department of Orthodontics and Dentofacial Orthopaedics, Pacific Dental College, Udaipur (Rajasthan), India.

Many studies have demonstrated that soft tissues are a major factor in determining a patient's final facial profile (Holdaway *et al*., 1983; Holdaway *et al*., 1984; Burstone *et al*., 1958; Arnett *et al*., 1993). Therefore, to attain and preserve optimal facial attractiveness, it is important that the orthodontist conduct a thorough facial examination so that orthodontic correction will not adversely affect the normal facial traits and can achieve best facial esthetics (Bergman, 1999). Arnett and Bergman presented facial keys to orthodontic diagnosis and treatment planning to obtain an overview of normal to ideal personality (Arnett *et al*., 1999). They developed the soft tissue cephalometric analysis (STCA) that emphasizes various soft tissue measurements which determines balance and harmony. It also emphasizes the importance of clinical examination of the patient, to correlate it with cephalometric findings. Soft tissue cephalometric standards have been developed for various ethnic groups and most of them have shown differences between different ethnic and racial groups (Lew *et al*., 1992; Rafael *et al*., 2000; Gunaid *et al*., 2007; Mehta *et al*., 2010; Anil kumar *et al*., 2010; Yadav *et al*., 2011 and Shindoi *et al*., 2013). Normal values of the STCA for Udaipur population of Rajasthan will help in Orthodontic diagnosis and treatment planning by providing average values for esthetic

parameters for the local population. As for all the ethnic groups norms differ, our aim was to develop soft-tissue cephalometric norms for Udaipur population to provide a holistic approach to orthodontic diagnosis and treatment planning in a better way.

MATERIALS AND METHODS

Sixty subjects (30 Males & 30 Females) from different part of Udaipur in age group 18-25 years, (Mean age 21.3 Years), with Angle's Class I occlusion, minimal or no crowding and spacing, and no history of previous orthodontic treatment; they displayed good facial aesthetics were selected at random for the study. Also, informed consent was obtained from all the patients. The patients having medical history were not selected for the study. Individuals, younger than 18 years were also not chosen due to possible growth changes. Initially clinical examination were done in natural head position, with seated condyles and passive lips. Metallic markers (made from thick lead foil covering of IOPA film) were placed on different soft-tissue structures of the mid-face (i.e. Soft tissue orbital rim, Soft tissue cheek bone, Subpupil and Nasal base) to relate them to the TVL as described by Arnett *et al*. All the lateral cephalograms were taken in natural head position using Kodak 8000 C Dental System. All lateral cephalometric films were hand traced by taking parameters of STCA (Arnett *et al*., 1999) on a transparent cellulose acetate sheet of 0.003" thickness. Overall 46 measurements including 5 dentoskel *et al*. 6 soft tissue structures, 9 Facial lengths, 14 projections to TVL and 12 facial harmony parameters were used in this study. The radiographs were hand traced two times at different time interval by single operator and standard error was calculated using unpaired t-test. Mean and standard deviation were calculated. The difference between males and females as well as Udaipur population and Arnett *et al*. (1999) norms were evaluated using student t-test.

RESULTS

The measurements to describe the soft tissue profile of Udaipur population were taken and mean and standard deviation was derived for males and female population. Paired t-test was used to calculate the error between the observers, unpaired t-test was used to compare Udaipur population with that of the Arnett *et al*., norms and significance of the difference between the male and female samples was tested with the Student t-test. So, Interpretitions in relation to the performed analysis ; can be listed as:

- Calculation of Intraobserver error done by paired 't' test , for soft tissue cephalometric norms for males and for females listed and there was no significant difference showed , which indicated the analysis readings to be reliable and free from any significant error.
- Comparison of Soft tissue cephalometric norms of males and females performed by 't' test ; which showed parameters to be very significantly different among the females from males .
- Also, Comparison of the soft tissue cephalometric norms for overall local population of males and females done by unpaired 't' test ; to compare the present study result with

the study done by Arnett *et al*. Results showed some parameters to be significantly different from that of white population.

In Dentoskeletal factors, there was no statistically significant difference between the sexes. Soft-tissue measurements indicated men were having increased thickness than women and also more acute nasolabial angles than women. All the facial lengths showed that males (nasion' to menton') were having longer faces than female ; all these measurements were statistically significant. Statistically significant differences, were also noted between the sexes in midface and the lower third structures of the face in the projections to TVL. In projection to TVL, orbital rims, cheekbone, subpupil, and alar base to TVL were higher in the men. The nasal projection was higher in the men when compared with the women; whereas in the lower third of the face, men were having protrusive lips .

DISCUSSION

All the findings were discussed under the categorization of 5 headings of the STCA of Arnett *et al*., dentoskel *et al* factors, soft-tissue structures, facial lengths, projections to TVL, and facial harmony. In each group, comparisons were drawn and analyzed between the male and female samples and compared with the original STCA as well. In the Dentoskeletal factor measurements, The male and female values for Mx occlusal plane angle, Mx1 to Mx occlusal plane, Md1 to Md occlusal plane within Udaipur population of Rajasthan showed statistically insignificant difference . Our samples had more proclined upper and lower anteriors when compared to Arnett *et al*., population for both the sexes, it might be because of ethnic differences of region. Among the Soft tissue measurements there were significant differences between the sexes; males had higher values for upper lip thickness and upper lip angle but lower values for nasolabial angle as compared to females. In comparison with the standard values of the STCA, the mean and standard deviation of all the parameters were found to be lower. This suggests that our subjects have thinner soft tissue structures than Arnett *et al*., population.

In regard to Facial length, the Udaipur population showed statistically significant gender differences in measurements of the Nasion'-Menton', Upper lip length, Lower lip length, Lower 1/3 of face, Mandibular height with values greater in males than in females. However females had a greater Overbite and Mx1 exposure than males. Study carried out by Kalha *et al*. (2008) on south Indian population showed similar findings in agreement with our study. In a study on soft tissue profiles by Scheideman *et al*. (1980), also reported increased lower face height in male subjects. This significant difference in facial lengths between men and women might be critical in treatment planning because these differences can be indications to increase or decrease face height during surgical procedures according to the need of treatment plan. TVL projections are anteroposterior measurements of soft tissues and represent the sum of the dentoskeletal position plus the soft tissue thickness overlying particular hard tissue landmark. Statistically significant gender differences were also found in the cheek bone, subpupil parameters. In the midface region,

males had more retruded or deep- set structures as shown by orbital rim, cheek bone, subpupil, and alar base markers to TVL (more negative to TVL) compared with the females. This might indicate midface deficiency in the males sample and females have more prominent midface. In the lower third of the face, males had more protrusive lips as shown by upper-lip to TVL This can be mainly because of the thicker soft-tissue structures in the males. Females had more proclined maxillary and mandibular anterior teeth as shown by Mx1 and Md1 to TVL. The projection value for the nose was slightly increased in males than females. This might as well contribute to the increased facial convexity in Udaipur males when compared to females. The Harmony values were obtained to measure the esthetic balance of facial structures. Harmony is the position of each landmark relative to other landmarks that determines facial balance of any person. These values represent the horizontal distance between two landmarks measured perpendicular to the TVL. These measurements basically examine four areas: intramandibular relations, interjaw relations, orbits to jaw and total face. In Intramandibular relationships , the mandibular central incisor to soft tissue pogonion and soft tissue B'-point to soft tissue pogonion' showed mild difference between males and females. Moreover , the mean values of the mandibular central incisor to soft tissue pogonion and soft tissue B' point to soft tissue pogonion' were insignificantly lower in the present subjects compared with the mean STCA also suggests hard tissue pogonion enlargement, or increased thickness of the soft tissue pogonion in face.

Interjaw relations directly controls the lower one third of facial esthetics as an important parameter, which showed slight mandibular retrusion or recessive lower face in males compared to females (increased A point'– B point' and ULA – LLA values) which might be the reason for increased convexity in males. On comparison to standard STCA norms, these parameters showed statistically decreased values in both males and females; indicating decreased recessive lower face in white population which was also supported by increased facial angle. Measurements of the orbital rim to the jaw also showed a statistically insignificant gender difference, with males and females both having retruded orbital rim in relation to the 2 jaws when compared to the arnetts' white population. The last part of the facial harmony evaluation assesses the upper face, midface, and the chin which are related via the facial angle (G'-Sn-Pog'); where the forehead is compared to two specific points, the upper jaw (G'-A') and chin (G'-Pog'). Arnett *et al*. (1999) indicated that these three measurements give the broad picture of facial balance. The parameter of full facial balance i.e facial angle showed statistically insignificant difference between the sexes. The mean facial angle of the females was a bit higher than that of males suggesting that males have more convex profiles within the population. On comparison with standard STCA norms both males and females, which showed increased convex profiles in local population.

Conclusion

Awareness of normal esthetic dentofacial pattern of each ethnic group will undoubtedly ensure better success of

treatment to establish optimal facial harmony. Therefore our study was done to establish the soft tissue cephalometric norms for the local population of Udaipur on basis of basic parameters for soft tissue profile given by Arnett *et al*. (Mehta, 2010), to develop a better perspective for orthodontic treatment. From this study the following observations were apparent: The most of the measurements of Udaipur population were different to that of Arnett *et al*., norms and within the Udaipur population males had thicker soft tissue structures, acute nasolabial angle, increased facial lengths and heights, increased midface deficiency, recessive lower face, more convex profile. The norms established can be used for diagnosing the soft tissues for this particular population.

REFERENCES

Anil kumar B, Shivalinga B. Establishment of south Indian soft tissue cephalometric norms using profile angles and esthetic analysis. World j orthod. 2010; 11: e104– e113.

Arnett GW, Bergman RT. Facial keys to orthodontic diagnosis and treatment planning. Part I. *Am J Orthod Dentofacial Orthop*. 1993; 103: 299-312.

Arnett GW, Jelic JS, Kim J, Cummings DR, Kim J, Beress A, Worley M, Chung B, Bergman R. Soft tissue cephalometric analysis: diagnosis and treatment planning of dentofacial deformity. *Am J Orthod Dentofacial Orthop*. 1999;116:239–253.

Bergman RT. Cephalometric soft tissue facial analysis. *Am J Orthod Dentofac Orthop*. 1999; 116: 373-89.

Burstone CJ. The integumental profile. *Am J Orthod*. 1958; 44: 1-25.

Gunaid TA, Yamada K, Yamaki M, Saito I. Soft-tissue cephalometric norms in Yemeni men. *Am J Orthod Dentofacial Orthop*. 2007; 132:576.e7-576.e14.

Holdaway RA. A soft tissue cephalometric analysis and its use in orthodontic treatment planning. Part I. *Am J Orthod*. 1983; 84: 1-28.

Holdaway RA. A soft tissue cephalometric analysis and its use in orthodontic treatment planning. Part II. *Am J Orthod*. 1984; 85: 279-93.

Kalha AS, Anwar L, Govardhan SN. Soft-tissue cephalometric norms in a South Indian ethnic population. *Am J Orthod Dentofacial Orthop*. 2008; 133: 876-81

Lew KK, Ho KK, Keng SB, Ho KH. Soft-tissue cephalometric norms in Chinese adults with esthetic facial profiles. *J Oral Maillofacial Surg*. 1992; 50 (11):1184-89.

Mehta P, Kumar M, Goel M, Koshy S. Holdaway's soft tissue cephalometric norms for the population of Lucknow, India. Journal of oral health research, volume I, Issue 4, December 2010.

Rafael EA, Tokiari JM, Gabriela O, Akira S, Raymond MS and Tomohiro M. Soft tissue cephalometric norms in Japanese adults. *Am J Orthod Dentofacial Orthop*. 2000; 118: 84-9

Scheideman GB, Bell WH, Legan HL, Finn RA, Reisch JS. Cephalometric analysis of dentofacial normals *Am J Orthod Dentofacial Orthop*. 1980 Oct: 404-20.

Shindoi JM, Matsumoto Y, Sato Y, Ono T, Harada K. Soft Tissue Cephalometric Norms for Orthognathic and Cosmetic Surgery. *J Oral Maxillofac Surg*. 71:e24e30, 2013.

Valo TS. Anterior esthetic and the visual arts: beauty, elements of composition, and their clinical application to dentistry. In Current Opinion in Cosmetic Dentistry. Golub-Evan J, Philadelphia, Current Science, 1995:24-32

Yadav, A.O., Walia, C.S., Borle, R.M., Chaoji KH, Rajan R, Datarkar AN. Cephalometric norms for Central Indian population using Burstone and Legan analysis. *Indian Journal of Dental Research,* 22(1), 2011.

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